Unofficial Comments on the Written Opinion of the International Searching Authority

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According to the present invention, electron mobility in the direction perpendicular to the step bunching can be improved by including the group V elements in the interface between the silicon carbide layer and the gate insulating film. As a result, electron mobility in the direction perpendicular to the step bunching can be more enhanced than that in the direction parallel to the step bunching. Further, it becomes possible to achieve high electron mobility while keeping such a structure in which the longest side of the source region is along the direction perpendicular to the off-cut direction.

The reference 1, JP 2003-234301A, and the reference 2, JP 2003-209251A, cited in the Written Opinion fail to disclose that the longest side of the source region is along the direction perpendicular to the off-cut direction as disclosed in the claimed invention.

The invention in reference 3, JP 10-321854A, is predicated on that the channel does not lie across the steps (see Fig. 18 and claim 7). This technical idea is different from that in the present invention in which the channel can be formed to lie across the steps. Additionally, it is almost impossible to actually form the semiconductor device over the steps and to provide the gate electrodes at regular intervals while avoiding the steps which occur in a random manner.

The reference 4, JP 2000-294777A, discloses forming the channel region in a flat part and therefore its technical idea is different from that in the present invention

that the channel can be formed over the steps.

The reference 5, JP 2001-517375A, and the reference 6, JP 2001-144288A, disclose that the structure in which the current flows across the steps causes electron mobility degradation. This idea is at the opposite end from the idea of the present invention.

The reference 7, JP 2002-280381A, and the reference 8, G. Y. Chung et al. "Improved Inversion Channel Mobility for 4H-SiC MOSFETs Following High Temperature Anneals in Nitric Oxide", IEEE Electron Device Letters, Vol. 22, No. 4, pp. 176-178, April 2001, do not focus attention to the direction of the longest side of the source region, i.e. perpendicular or parallel to the off-cut direction.

As explained above, the inventions in the references 1 to 8 are totally different from the present invention. None of these references has reached the conclusion as the present invention has that electron mobility is higher in the direction perpendicular to the off-cut direction, after comparing the electron mobility in the direction perpendicular and parallel to the off-cut direction. Therefore, the present invention cannot be easily anticipated by even the combination of these references.